

THE DIATOM TYPES OF EMILE MANGUIN. I. VALIDATING DESCRIPTIONS AND DESIGNATION OF ICONOTYPES FOR THE LAKE KARLUK SPECIES.

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ABSTRACT — The 51 taxa described as new by Emile Manguin in his 1961 paper on diatoms from Lake Karluk, Alaska (USA), lacked Latin descriptions and type designations; they are therefore invalid according to the International Code of Botanical Nomenclature. We provide Latin descriptions for Manguin's taxa and, due to our inability to find original slides or material in Manguin's collection, we designate holotypes from Manguin's original work. English translations of the original French descriptions are also provided.

RÉSUMÉ - Dans son article de 1961 sur les diatomées du lac Karluk, Alaska (USA), Emile Manguin a décrit 51 nouveaux taxons, mais sans accompagner ses descriptions de diagnoses latines et sans désigner de type : ils sont donc invalides selon le code international de nomenclature botanique. Nous fournissons une diagnose latine pour chacun des taxons de Manguin. N'ayant pu trouver les préparations ou les récoltes originales de cet auteur, nous avons désigné les illustrations de son article comme iconotypes. Des traductions en anglais des descriptions originales en français sont aussi fournies.

KEY WORDS: Bacillariophyceae, diatom, taxonomy, nomenclature, type, Alaska, Manguin.

INTRODUCTION

Emile Manguin published numerous works between 1933 and 1964 on diatoms from localities around the world (see Bourrelly 1967a, b for summaries of most, but not all, of Manguin's papers). His works covered fossil and recent localities, marine and freshwater habitats and a broad spectrum of diatom taxa. Manguin's collection resides in the Laboratoire de Cryptogamie, Muséum National d'Histoire Naturelle, Paris (PC). Manguin rarely identified type specimens on his slides, or the slides as types, and in some cases none of the original slides can be found; only material is extant.

In his contribution on the diatoms of Lake Karluk, Alaska, Manguin (1961)

proposed 51 taxa as new. He did not meet the requirements for valid publication, however, because he omitted Latin descriptions and did not designate types for his new taxa (International Code of Botanical Nomenclature, Articles 32.1, 36, 37; Greuter *et al.* 1994). We have been unable to find slides or material from Lake Karluk in the Manguin collection at PC. Therefore, in this first contribution on the diatom types of Manguin, we offer validating descriptions and typification of his taxa by designating his original illustrations as holotypes for the species as provided for in Article 8.3 of the ICBN (Greuter *et al.* 1994). Since Manguin's taxa were not validly published, they must be treated as new and originating in this publication.

Pagination under each new taxon name indicates the page in Manguin (1961) on which his description appears. Holotype designation is the plate and figure number in Manguin's work. English translations of the original French descriptions are also provided. Figure explanations for plates 5 and 6 were reversed in Manguin's publication. We recognize the plate order as it is presented in the body of the manuscript, not the order of the figure explanations.

NEW TAXA, DESCRIPTIONS AND TYPE DESIGNATIONS

Cyclotella bodanica Eulenstein in Grunow var. *intermedia* Manguin ex Kociolek & Reviere

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Holotype: Pl. 1, fig. 1

Description: Diameter 23 μm . *Zona marginalis striis subtiliter lineatis 11/10 μm , punctis sejunctis 2-3/10 μm . Zona intermedia tecta seriebus irregularibus punctorum. Zona centralis tecta punctis sparsis.*

Description: Diameter 23 μm , marginal zone with 11 striae/ 10 μm finely lineate, 2-3 isolated puncta ('flamettes') in 10 μm . Intermediate zone covered by irregular rows of puncta. Central zone covered with sparse puncta.

Cyclotella lacus-karluki Manguin ex Kociolek & Reviere

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Holotype: pl. 1, fig. 6

Description: *Forma perpusilla. Diameter 3-3.5. Striae circa 13/10 μm . Spinae parvae 4-5 prope marginem valvarum. Zona centralis punctis 2-3 circumcinctis corona umbrosa, seperata striis spatlo magno hyalino.*

Description: Very small form, diameter 3-3.5 μm , about 13 striae/10 μm , 4-5 minute spines placed near the edge of the valve. Central zone as 2-3 puncta surrounded by the hint of a shadow, separated from the striae by a large hyaline space.

***Fragilaria capucina* Desmazières var. *sublinearis* Manguin ex Kociolek & Reviere**

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Holotype: p. 1, fig. 7**Descriptio:** *Valvae linearis lateribus parallelis. Longitudo 39 µm. Latitudo 13 µm. Striae 16/10 µm. Pseudoraphe lanceolata. Area centralis relative elata marginata striis marginali brevissimis et vix visibilibus.***Description:** Valves linear with parallel sides, length 39 µm, breadth 3 µm; 16 striae/10 µm. Pseudoraphe lanceolate, central area relatively high and bordered by very short and barely visible marginal striae.***Fragilaria pseudocylindrus* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 9**Descriptio:** *Frustula connexa in filis rectangularis. Valvae linearis constrictae leviter prope polos late rotundato. Longitudo 26 µm. Latitudo 2.5 µm. Striae circa 14/10 µm, perpendiculares lineae medianae. Pseudoraphe perangusta autem manifesta.***Description:** Frustules connected in rectangular bands. Valves linear, lightly constricted near the broadly rounded poles, length 26 µm, breadth 2.5 µm, about 14 striae/10 µm, perpendicular to the median line. Pseudoraphe very narrow but apparent.***Fragilaria vaucheriae* (Kützing) Petersen var. *elliptica* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 10**Descriptio:** *Valvae late ellipticae-lanceolatae, ad extremitibus leniter contractae, ad polos late rotundatae. Longitudo 9.5 µm. Latitudo 4.5 µm. Striae 12-13/10 µm. Area centralis unilateralis peraperia. Pseudoraphe distincte lata versus area laterali.***Description:** Valves very widely elliptical-lanceolate, weakly contracted at the extremities, broadly rounded at poles, length 9.5 µm, breadth 4.5 µm, 12-13 striae/10 µm. Unilateral central area very open. Pseudoraphe notably widens towards lateral area.***Achnanthes bernierii* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 18, 19**Descriptio:** *Valvae lanceolatae plus minusve ad extremitibus contractae-rostratae, polis rotundatis-obtusis. Longitudo 22 µm. Latitudo 4.5 µm. Valva sine raphe striis radialibus circa 10-13/10 µm, pseudoraphe angusta ad extremitibus deminuta. Valva raphe striis numeri pro valva opposita, radialibus, striis medianis abbreviatis, lineis longitudinalibus hyaline subtilibus undulatis cruciatim. Area axialis perangusta. Raphe recta filiformis.***Description:** Valves lanceolate more or less constricted to subrostrate at the extremities, poles rounded-obtuse, length 22 µm, breadth 8 µm. Valves without raphe have radiate

striae about 10-13/10 μm ; pseudoraphe narrow, shrinking towards the extremities. Raphe valve with striae of like number as the opposing valve, also radial, the median striae shortened, crossed by the delicate undulate hyaline longitudinal lines. Axial area linear very narrow. Raphe straight filiform.

***Achnanthes hilliardii* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 24-26

Descriptio: *Valvae ellipticae. Longitudo 14 μm . Latitudo 4.5 μm . Striae radiatae et similes in ambo valvis, 16-18/10 μm . Puncta visa difficulter.*

Description: Valves elliptical, length 14 μm , breadth 4.5 μm . Striae radial and similar in number on the two valves, 16-18/10 μm . Puncta difficult to resolve.

***Achnanthes lacus-karluki* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 27, 28

Descriptio: *Valvae ellipticae-lanceolatae. Longitudo 17 μm . Latitudo 8 μm . Striae in ambo valvis 16-18/10 μm . Valvae sine raphibus area axilla plus minusve perangusta. Area centralis unilateralis rectangularis, margini valva expansa, nota marginali semicirculari. Valva raphe area axiali angusta lineari. Raphe filiformis poris centralibus manifeste obvis.*

Description: Valves elliptical lanceolate, length 17 μm , breadth 8 μm ; striae on the two valves about 16-18/10 μm . Valves without raphe have an axial more or less linear and very narrow. Central area unilaterally rectangular extending up to the border of the valve, provided with a marginal mark of a semicircle. Valve with raphe with a narrow linear axial area; raphe filiform with central pores easy to see.

***Achnanthes oblonga* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 35, 36

Descriptio: *Valvae ellipticae-lanceolatae, extremitibus late roundatis. Longitudo 17 μm . Latitudo 5 μm . Striae radiales circa 23/10 μm in ambo valvis. Valva sine raphe pseudoraphe lineari stricta, area centrali dilatata unilateralibus ad marginem valvae. Striae medianae duae oppositae aream centalem dilute abbreviatae et dispositae ultra vicinis strias. Valva raphe area axiali lineari recta. Area centralis circularis parvula.*

Description: Valves elliptical-lanceolate, broadly rounded at the extremities, length 17 μm , breadth 5.5 μm , about 23 radial striae in 10 μm on both valves. Valve without raphe possesses a linear pseudoraphe that is very straight, central area unilaterally enlarged to the edge of the valve, the 2 median striae opposite are slightly more short and more spaced than their neighbors. Raphe valve with a linear, straight axial area, circular central area very small.

Achnanthes pseudosuchlandtii Manguin ex Kociolek & Reviere

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Holotype: pl. 1, fig. 37, 38

Description: *Valvae lateribus fere parallelis sed dilute convexis ad partem medianam, ad extremitibus contractis abrupte et rostratis ad subcapitatis, polis late rotundatis. Longitudo 8 µm. Latitudo 3.5-4 µm. Valva sine raphe striis radialibus 26-28/10 µm. Striae peragratae sulco longitudinali hyalino. Pseudoraphe linearis perangusta. Valva raphe striis radiali 25-26/10 µm, area axiali lanceolata, raphe filiformi.*

Description: Valves with nearly parallel sides but very slightly convex about the median part, abruptly contracted and rostrate to subcapitate at the extremities with poles broadly rounded. length 8 µm, breadth 3.5-4 µm. Valve without raphe has radial striae, 26-28/10 µm, crossed by a hyaline longitudinal groove, pseudoraphe linear, very narrow. Valve with raphe has radial striae 25-26/10 µm, axial area lanceolate, raphe filiform.

Diploneis voigtii Manguin ex Kociolek & Reviere

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Holotype: pl. 2, fig. 1

Description: *Valvae ellipticae late. Longitudo 30 µm. Latitudo 14 µm. Nodus centralis subquadratus. Cornua perdistincta et parallela. Sulcus raphis dilute profundus. Canalis longitudinalis angustatus et dilute amplificatus circum nodulo centrali, extremitibus convergens. Costae transapicales robustae radiales 9-10/10 µm, peragratae lineis 3 longitudinalibus incurvatis, linea intermedia minus notata et ad extremitibus non extensis. Linea subtilis umbrosa visibilis inter lineis longitudinalibus. Canalis longitudinalis peragratus costis transapicalibus, sine seriebus pori.*

Description: Valves widely elliptical, length 30 µm, breadth 14 µm. Central nodule with a subquadrate shape; horns very distinct and slightly larger around the central nodule, becoming convergent towards the extremities. Transapical ribs robust, radial, 9-10/10 µm, crossed by 3 incurved longitudinal bands, the less marked intermediate band does not extend to the extremities of the valve, between these bands a delicate shadow line is visible. Longitudinal canal crossed by the transapical ribs, without rows of pores.

Navicula amoena Manguin ex Kociolek & Reviere

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Holotype: pl. 1, fig. 39

Description: *Valvae ellipticae ad circulares. Longitudo 10.5 µm. Latitudo 7.5 µm. Area axialis perangusta versus nodulum centrale dilute latum factum. Raphe filiformis prope porum centrum leviter manifesta. Striae valde radiales 23-26/10 µm ad partem medianam, 30 et plus/10 µm ad extremitatum. Striae medianae abbreviatae irregulariter.*

Description: Valves elliptical to subcircular, length 10.5 µm, breadth 7.5 µm. Axial area very narrow, weakly broadening towards the central nodule. Raphe filiform slightly more apparent near the central pores. Striae strongly radial, 23-26/10 µm at the median part, 30 and more/10 µm at the extremities, the median striae irregularly shortened.

***Navicula bourrellyi* Manguin ex Kociolek & Reiers**

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Holotype: pl. 1, fig. 40

Description: *Valvae marginem medianum dilute convexae, ad extremitatum contractae tum capitatae. Longitudo 15-16 µm. Latitudo 6.5 µm. Area axialis perangusta. Area centralis amplificata transverse. Striae radiales 19-23/10 µm.*

Description: Valves weakly convex at the median margin, contracted then capitate at the extremities, length 15-16 µm, breadth 6.5 µm. Axial area very narrow, central area enlarged transversely. Radial striae 19-23/10 µm.

***Navicula clementis* Grunow var. *quadristigmata* Manguin ex Kociolek & Reiers**

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Holotype: pl. 2, fig. 2

Description: *Valvae late ellipticae-lanceolatae, ad extremitatum subrostratae. Longitudo 22 µm. Latitudo 9 µm. Striae radiales 12-13/10 µm. Striae medianae curvae et abbreviatae alternatim. 2 stigmata in quoque latere noduli centralis.*

Description: Valves broadly elliptical-lanceolate, subrostrate at the extremities, length 22 µm, breadth 9 µm. Radial striae 12-13/10 µm. The median striae curved and alternately shortened. Two stigmata points on each side of the central nodule.

***Navicula disjunctoides* Manguin ex Kociolek & Reiers**

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Holotype: pl. 2, fig. 3

Description: *Valvae anguste ellipticae-lanceolatae, late rostratae-subcapitatae ad polis. Longitudo 21.5 µm. Latitudo 4.5 µm. Area axialis angusta linearis, area centralis rectangularis. Striae radiales 12-13/10 µm, perpendiculares lineae medianae ad extremitatum.*

Description: Valves narrowly elliptical-lanceolate, broadly rostrate-subcapitate at the extremities, length 21.5 µm, breath 4.5 µm. Axial area narrow linear; central area rectangular. Striae radial 12-13/10 µm, the terminal ones perpendicular to the median line. This species is differentiated from *N. disjuncta* Hust. by the perpendicular direction of the terminal striae and the less dense general striation.

***Navicula exigua* (Gregory) Grunow in Van Heurck var. *alaskensis* Manguin ex Kociolek & Reiers**

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Holotype: pl. 2, fig. 4

Description: *Valvae late ellipticae-lanceolatae, ad extremitatum dilute angustatae polis rotundatis-obtusis. Longitudo 15-16 µm. Latitudo 7 µm. Striae radiales 15/10 µm. Striae medianae alternatim longae et breves.*

Description: Valves broadly elliptical-lanceolate, weakly narrowed at the extremities, poles rounded-obtuse, length 15-16 µm, breadth 7 µm, 15 radial striae in 10 µm, the median ones alternately long and short.

***Navicula fossilioides* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 5

Descriptio: *Valvae lanceolatae ad extremitatum rotundatae-obtusae. Longitudo 11-15 µm. Latitudo 3-4 µm. Area axialis lanceolata 1/5-1/3 latitudinis valvae in parte mediana. Striae radiales circa 13-15/10 µm.*

Description: Valves lanceolate rounded-obtuse at the extremities, length 11-15 µm, breadth 3-4 µm. Axial area lanceolate, 1/5 to 1/3 of the length of the valve in the median part. Radial striae about 13-15/10 µm.

Comments: Two figures of this taxon were presented by Manguin (pl. 2, figs 5 and 6), but they differed significantly from each other, particularly with respect to striae length and density. We have chosen figure 5 as the holotype since it most closely fits the short description provided by Manguin.

***Navicula hilliardii* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 7

Descriptio: *Valvae lineares-ellipticae polis rotundatis. Longitudo 32 µm. Latitudo 8 µm. Area axialis versus nodulum centralem amplificata manifeste, faciens ellipticam aream centralem. Raphe recta polis centralibus aliquantum distantibus inter se. Striae radiales punctatae circa 18/10 µm ad extremitatum plus dense.*

Description: Valves linear-elliptical with poles broadly rounded, length 32 µm, breadth 8 µm. Linear axial area noticeably enlarged in the direction of the central nodule, becoming an elliptical central area. Raphe straight with central pores fairly distant from each other. Radial striae punctate about 18/10 µm, more compact towards the extremities.

***Navicula illicita* Manguin ex Kociolek & Reviere**

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Holotype: pl. 1, fig. 43

Descriptio: *Valvae ellipticae. Longitudo 8 µm. Latitudo 3-3.5 µm. Area axialis elliptica occupans grandem partem valvae. Raphe vix visibilis prope nodulum centralem, non nisi lineam umbrosam alibi. Striae marginales brevissimae radiales 20/10 µm.*

Description: Valves elliptical, length 8 µm, breadth 3-3.5 µm. Axial area elliptical occupying a large expanse of the valve. Raphe hardly visible near the central nodule, indicated only by a shaded line the rest of the route. Marginal striae very short, radial, 20/10 µm.

***Navicula insolita* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 8

Descriptio: *Valvae lineares-ellipticae polis late rotundatis. Longitudo 26-34 µm. Latitudo 8-9.5 µm. Area axialis linearis ad extremitatum aperata area polari circulari. Area*

centralis elliptica. Sulcus internus raphis dilute amplificatus circum nodulum centalem et ad polos. Rami raphis prope nodulum polarem costa parva ad modum manifesta interrupti. Striae radiales 15-20/10 μm ad extremitatum 23-26/10 μm . 2-3 in quoque latere area centrali plus abbreviatae.

Description: Valves linear-elliptical, poles broadly rounded, length 26-34 μm , breadth 8-9.5 μm . Axial area linear broad, open at the extremities only a circular polar area, central area elliptical. Raphe running in the interior of the furrow, somewhat slightly enlarged around the central nodule and towards the poles; branches of the raphe interrupted at the polar nodules by a small rib that is quite apparent. Striae radial, 15-20/10 μm , 23-26/10 μm at the extremities, 2-3 striae more shortened on each side of the central area.

Navicula lacus-karluki Manguin ex Kociolek & Reviere

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Holotype: pl. 2, fig. 10

Description: Valvae lanceolatae ad extremitatum attenuatae, ad polos rotundatas obtusos. Longitudo 21 μm . Latitudo 5.5 μm . Area axialis lanceolata anguste. Area centralis subcircularis. Raphe poris manifestis. Striae valde radiales, ad extremitatum convergentes, 9/10 μm . Striae terminales cristis marginalibus destitutae.

Description: Valves lanceolate, attenuate at the extremities, rounded obtuse at the poles, length 21 μm , breadth 5.5 μm . Axial area narrow, lanceolate, central area subcircular. Raphe with pores apparent. Radial striae robust, convergent at the extremities, 9/10 μm , the terminal striae without ridges only their sides.

Navicula minimoides Manguin ex Kociolek & Reviere

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Holotype: pl. 1, fig. 44

Description: Valvae ellipticae. Longitudo 12.5 μm . Latitudo 6.5 μm . Area axialis angusta linearis. Area centralis elliptica. Raphe poris centralibus manifestis et inter se accendentibus. Striae radiales 13/10 μm , ad extremitatum plus densae.

Description: Valves elliptical, length 12.5 μm , breadth 6.5 μm . Axial area narrow, linear, central area elliptical. Raphe with central pores obviously apparent and approaching each other. Radial striae 13/10 μm , very condensed at the extremities.

Navicula opiei Manguin ex Kociolek & Reviere

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Holotype: pl. 2, fig. 12

Description: Valvae lineares lateribus parallelis et polis late rotundatis. Longitudo 13-19 μm . Latitudo 5-6 μm . Area axialis linearis circum nodulum centalem vix amplificata. Raphe poris centralibus manifestis. Striae radiales 23-26/10 μm linea longitudinali hyalina prope aream centalem peragratae.

Description: Valves linear, sides parallel, broadly rounded at the poles, length 13-19 μm , breadth 5-6 μm . Axial area linear hardly enlarged around the central nodule. Raphe with central pores well apparent. Radial striae 23-26/10 μm , crossed by a hyaline longitudinal line near the axial area.

***Navicula perfida* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 13

Descriptio: *Valvae ellipticae. Longitudo 9.5 µm. Latitudo 5 µm. Area axialis linearis angusta. Area centralis expansa irregulariter. Raphe filiformis. Striae perpendiculares lineae medianae, 19/10 µm ad partem medianam 23/10 µm ad extremitatum.*

Description: Valves elliptical, length 9.5 µm, breadth 5 µm. Axial area linear, narrow. Central area irregularly expanded. Raphe filiform. Striae perpendicular to the median line, 19/10 µm at the median part, 23/10 µm towards the extremities.

***Navicula pseudohasta* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 14

Descriptio: *Valvae ellipticae-lanceolatae elongatae ad extremitatum, ad polis rotundatis-angustis. Longitudo 34-37 µm. Latitudo 8-9 µm. Area axialis lanceolata perangusta. Area centralis circularis. Raphe versus poros centrales plus notatae. Striae radiales 10/10 µm subtiliter lineatae.*

Description: Valves elliptical-lanceolate, elongated to the extremities, rounded to subacute at the poles, length 34-47 µm, breadth 8-9 µm. Axial area lanceolate, very narrow; central area circular. Raphe more emphasized towards the central pores. Radial striae 10/10 µm, finely lineate.

***Navicula semidiversa* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 17

Descriptio: *Valvae ellipticae-lanceolatae ad extremitatum subrostratae ad polis late rotundatis. Longitudo 15.5 µm. Latitudo 5.5 µm. Area axialis linearis. Area centralis rectangularata. Striae radiales 23-27/10 µm, abrupte parallel ad extremitatum. Striae medianae alternatim abbreviatae.*

Description: Valves elliptical-lanceolate, subrostrate at the extremities, broadly rounded at the poles, length 15.5 µm, breadth 5.5 µm. Axial area linear, central area rectangular. Radial striae pass abruptly in direction to parallel at the extremities, the median striae alternately shortened, 23-27/10 µm

***Navicula verecundoides* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 18

Descriptio: *Valvae ellipticae-lanceolatae, ad extremitatum decrescentes subrostratae ad polis late rotundatis. Longitudo 13.5 µm. Latitudo 5.5 µm. Area axialis perangusta dilute lanceolata. Area centralis late rectangularis. Striae radiales 26/10 µm ad extremitatum 28-30/10 µm. Striae medianae abbreviata ordinatae.*

Description: Valves elliptical-lanceolate, tapering, subrostrate at the extremities, largely rounded at the poles, length 13.5 µm, breadth 5.5 µm. Axial area very narrow, weakly

lanceolate; central area broadly rectangular. Radial striae 26/10 μm . 28-30/10 μm at the extremities. Median striae regularly shortened.

***Caloneis bacillaris* (Gregory) Cleve var. *rectangularis* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 19

Description: *Valvae lineares, ad polis late rotundatis. Longitudo 13 μm . Latitudo 4.5 μm . Area axialis angusta linearis. Striae ad lineam medianam perpendicularares, ad extremum radiales 23-26/10 μm .*

Description: Valves linear, broadly rounded at poles, length 13 μm , breadth 4.5 μm . Linear axial area narrow, striae perpendicular to the median line, radial at the terminus, 23-26/10 μm .

***Caloneis brevis* (Gregory) Cleve var. *minutissima* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 20

Description: *Valvae ellipticae-lanceolatae ad extremitatum attenuatae-subrostratae, polis rotundatis. Longitudo 17 μm . Latitudo 6 μm . Striae radiales circa 18/10 μm . Linea longitudinalis hyalinus dilute manifestus.*

Description: Valves elliptical-lanceolate, attenuate-subrostrate at the extremities. poles broadly rounded, length 17 μm , breadth 6 μm , about 18 radial striae/ 10 μm , hyaline longitudinal line slightly apparent.

***Caloneis patagonica* (Cleve) Cleve var. *alaskensis* Manguin ex Kociolek & Reviere**

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Holotype: pl. 2, fig. 21

Description: *Valvae lineares-lanceolatae. Longitudo 41-42 μm . latitudo 7-8 μm . Area axialis occupans dilute plus quam 1/3 latitudinem valvae. Striae radiales 15-16/10 μm . Linea longitudinalis accedens aream axialem.*

Description: Valves linear-lanceolate, length 41-42 μm , breadth 7-8 μm . Axial area occupies slightly more than 1/3 the breadth of the valve. Radial striae 15-16/10 μm ; longitudinal lines approaches the axial area.

***Pleurosigma longum* Cleve var. *inflatum* H. Peragallo f. *minus* Manguin ex Kociolek & Reviere**

(*P. longum* Cleve var. *inflata* H. Peragallo f. *minor* Manguin nom. nud.)

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Holotype: pl. 6, fig. 11, 12 (these two figures are of the same specimen)

Description: Longitudo 127-148 μm . Latitudo 23-26 μm . Striae obliquae 15/10 μm . Striae transversalis 16-17/10 μm . Dimensiones parvior quam P. longum var. inflata f. inflata.

Description: Length 127-148 μm , breadth 23-26 μm , 15 oblique striae and 16-17 transverse striae in 10 μm . Dimensions smaller than that of the variety.

Amphora hilliardii Manguin ex Kociolek & Reviere

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Holotype: pl. 2, fig. 24

Description: Valvae margine dorsali valde arcuata, in margine ventrali dilute tumida, ad extremitatum abrupte constrictae tum amplificatae insigniter, ad polis truncatis. Longitudo 19.5 μm . Latitudo 19.5 μm . Latitudo ad medietatem 5 μm , ad polis 2.5 μm . Area axialis angusta. Area centralis nulla. Rami raphis dilute obliqui ad poros centrales non nisi incurvati. Striae dorsales circa 23-26/10 μm ad extremitatum plus quam 30/10 μm . Striae medianae prope marginem valvae interruptae spatio striato subtiliter in margine dorsali. Margo ventralis non-striatus.

Description: Valves with dorsal margin strongly arched, weakly tumid on the ventral margin, abruptly constricted at the extremities then notably enlarged; poles truncate, length 19.5 μm , breadth at median 5 μm , 2.5 μm at poles. Axial area narrow; central area lacking. Raphe branches weakly oblique, incurved only at the central pores. Dorsal striae about 23-26/10 μm , more than 30/10 μm at the extremities. The median striae are interrupted near the valve margin by a finely striated space on the dorsal border; ventral border non-striated.

Amphora parallelistriata Manguin ex Kociolek & Reviere

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Holotype: pl. 2, fig. 25

Description: Valvae margine dorsali arcuata, margine ventralis rectus ad extremitatum dilute depressae, polis rotundatis-obtusis. Longitudo 28 μm , latitudo 7.5 μm . Area axialis perangusta. Area centralis non nisi ad marginem ventralem extensa. Raphe recta. Striae dorsales parallelae 13/10 μm apertura elongatae formatae. Striae ventrales perabbreviatiae 13/10 μm .

Description: Valves with dorsal margin arched, the ventral margin straight, slightly depressed at the extremities and poles rounded obtuse, length 28 μm , breadth 7.5 μm . Axial area very narrow, central area expanded only to the ventral margin. Raphe straight. Dorsal striae parallel, 13/10 μm formed by long dashes; ventral striae very reduced and the same number as the dorsal.

Cymbella aequalis Wm. Smith in Greville var. *alaskensis* Manguin ex Kociolek & Reviere

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Holotype: pl. 2, fig. 26

Description: Valvae dimorphae plerumque, symmetricae vel plus minusve asymmetricae, vel ellipticae, vel margine ventrali plus minusve in parte mediana recta, polis late rotundatis. Longitudo 16-19 μm . Latitudo 7-8 μm . Area axialis linearis-lanceolata. Area centralis

certa ordinate. Raphe centralis vel dilute excentrica. Striae radiales, striis medianis perpendicularis interdum et circum nodulum centalem plerumque incurvatis, partem medianam 9-12/10 μ m et ad extremitatum 15-22 μ m.

Description: Valves frequently dimorphic, symmetrical to more or less asymmetrical, to contoured regularly elliptical or to the ventral margin more or less straight in the median part, broadly rounded at the poles, length 16-19 μ m, breadth 7-8 μ m, axial area linear-lanceolate, central area regularly delimited. Raphe central or weakly excentric. Striae radial, the median striae sometimes perpendicular and frequently incurved around the central nodule, 9-12/10 μ m at the median part and 15-22/10 μ m towards the extremities.

Comments: Manguin provided four figures for this taxon (pl. 2, figs 26-29), and we have selected one of these to serve as the neotype.

***Cymbella austriaca* Grunow in Schmidt et al. var. *semirecta* Manguin ex Kociolek & Reviere**

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Holotype: pl. 3, fig. 1

Descriptio: *Valvae asymmetricae in margine dorsali convexae in margine ventrali rectae. Longitudo 65 μ m. Latitudo 15 μ m. Striae radiales. Striae medianae in latere dorsali 9-10/10 μ m et in latere ventrali 13/10 μ m, distincte lineatae. Raphe lateralis, undulatae prominenter.*

Description: Valves asymmetrical convex on the dorsal margin, straight on the ventral margin. Length 65 μ m, breadth 15 μ m. Striae radial, the median striae 9 in 10 μ m on the dorsal side and 13 in 10 μ m on the ventral side, distinctly lineate. Raphe with accentuated undulations with accompanying lines.

***Cymbella cistula* Hemprich in Hemprich & Ehrenberg var. *globosa* Manguin ex Kociolek & Reviere**

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Holotype: pl. 3, fig. 3

Descriptio: *Valvae ambitu perlunato, margine ventrali incurvo ad extremitatum et in medio tumido. Longitudo 33-47 μ m. Latitudo 14-16 μ m. Striae medianae dorsales 13/10 μ m et ventrales 8/10 μ m.*

Description: Valves with very accentuated lunate outline, ventral margin incurved at the extremities and tumid at the middle, length 37-47 μ m, breadth 14-16 μ m, median striae dorsal and ventral 13 in 10 μ m and 8 in 10 μ m, respectively.

***Cymbella frenguelli* Manguin ex Kociolek & Reviere**

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Holotype: pl. 3, fig. 5

Descriptio: *Valvae symmetricae ellipticae-lanceolatae, ad extremitatum dilute constrictae, polis late rotundatis. Longitudo 78 μ m. Latitudo 14.5 μ m. Area axiali lanceolata in medio valvae occupans quase 1/3 latitudinem valvae. Raphe lateralis ramis abrupte*

inflexis versus nodulum centralem. Striae radiales punctatae, puncta 23/10 μm . Striae medianae 18/10 μm . Striae terminales 22-24/10 μm .

Description: Valves symmetrical, elliptical-lanceolate, weakly constricted at the extremities, broadly rounded at the poles, length 78 μm , breadth 14.5 μm . Axial area lanceolate occupies towards the middle of the valve slightly more than 1/3 the breadth of the valve. Raphe with accompanying line, branches abruptly inflexed towards the central nodule. Striae radial, punctate, the median striae 18 in 10 μm , the terminal striae 22-24 in 10 μm ; 23 puncta in 10 μm .

Cymbella hilliardii Manguin ex Kociolek & Reviere

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Holotype: pl. 3, fig. 6

Descriptio: *Valvae asymmetricae ellipticae-lanceolatae et ad extremitatum rostratae, margine dorsali plus convexo quam margine ventrali. Longitudo 34 μm . Latitudo 9 μm . Area axialis lanceolata. Raphe recta excentrica rima polari incurvato versus latus ventralem. Striae radiales structura absentis. Striae dorsales et ventrales 12-13/10 μm ad partem medianam, circa 15/10 ad extremitatum.*

Description: Valves asymmetrical, elliptical-lanceolate and rostrate at the extremities, the dorsal margin more convex than the ventral, length 34 μm , breadth 9 μm . Axial area lanceolate. Raphe straight, excentric with polar slit incurved towards the ventral side. Radial striae without apparent structure, respectively, the dorsal striae and the ventral striae 12-13 in 10 μm in the median part, about 15 in 10 μm towards the extremities.

Cymbella lacus-karluki Manguin ex Kociolek & Reviere

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Holotype: pl. 3, fig. 7

Descriptio: *Valvae asymmetricae in margine dorsali convexae, in margine ventrali rectae ad polis late rotundatis. Longitudo 28.5 μm . Latitudo 6.5 μm . Area axialis lanceolata. Area centralis elliptica in longitudinem et latitudinem. Rami raphis distincte obliquus et valde incurvus versus nodulum centralem. Striae radiales structura absentis. Striae dorsales medianae 9/10 μm et striae ventrales 10-11/10 μm . Puncta 2 mediana in latere ventrali sejuncta.*

Description: Valves asymmetrical, convex on the dorsal margin and straight on the ventral margin, broadly rounded at the poles, length 28.5 μm , breadth 6.5 μm . Axial area lanceolate; central area elliptical in length and breadth. Raphe branches clearly oblique and strongly incurved towards the central nodule. Radial striae without structure, dorsal median striae 9 in 10 μm and ventral striae 10-11 in 10 μm . Two isolated median points on the ventral side.

Gomphonema alaskensis Manguin ex Kociolek & Reviere

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Holotype: pl. 3, fig. 9

Descriptio: *Valvae clavatae, in partem medianam distincte dilatatae, ad extremitatum*

gradatim angustatae. Capiti-polus late rotundatus. Basi-polus amplificatus et subcapitatus, ad extremam constrictus. Longitudo 39 µm. latitudo 10.5 µm. Area axialis lanceolata. Area centralis subcircularis. Raphe undulata poris centralibus permanifestis. Striae radiales lineatae longitudine inaequali circum nodulum centralem, 12/10 µm. Puncta sejuncta destituta.

Description: Valves claviform, noticeably dilated in the median part, gradually narrowed towards the extremities, headpole broadly rounded, constricted to the end of the footpole, this enlarged and subcapitate, length 39 µm, breadth 10.5 µm. Axial area lanceolate, central area subcircular. Raphe undulate with central pores obviously apparent, striae radial, lineate, of unequal length around the central nodule, 12 in 10 µm. No isolated puncta.

Gomphonema drouetii Manguin ex Kociolek & Reviere

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Holotype: pl. 3, fig. 10

Descriptio: Valves clavatae crassae, in parte mediana valde dilatatae ad extremitatum gradatim angustatae. Capito-polus late rotundatus. Basi-polus amplificatus, subcapitatus ad extremitatum constrictus. Longitudo 25 µm. Latitudo 9 µm. Area axialis lanceolata circum nodulum centralem distincte amplificata. Raphe recta, ramis versus poros centrales incurvatus. Striae radiales structura absentis, 13/10 µm. Striae medianae longitudine aequali. Punctum sejunctum in 1 latere noduli centralis.

Description: Valves stocky clavate, strongly dilated in the median part, gradually narrowed towards the extremities, headpole broadly rounded constricted to the end to the footpole, this last enlarged and subcapitate, length 25 µm, breadth 9 µm. Axial area lanceolate notably enlarged around the central nodule. Raphe straight, the branches incurved to the central pores. Striae radial without apparent structure, 13 in 10 µm, the median striae of equal length towards an isolated point on one side of the central nodule.

Gomphoneis quadripunctata (Ørstrup) Dawson ex Ross & Sims var. *cochleariformis* Kociolek & Stoermer 1991, p. 1570, figs 115, 129, 130

The diatom presented by Manguin as *Gomphonema olivaceoides* var. *cochleariformis* (Manguin, p. 282, pl. 3, fig. 14; pl. 5, fig. 8) was subsequently encountered in Lake Superior and validly described by Kociolek & Stoermer (1991).

Gomphonema olivaceoides Hustedt var. *lanceolatum* Manguin ex Kociolek & Reviere

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Holotype: pl. 3, fig. 15

Descriptio: Valvae elongatae lanceolatae. Capiti-polus et basi-polus rotundatus, latitudine fere aequalibus. Longitudo 36.5 µm. latitudo 5.5 µm. Striae circa 13/10 µm.

Description: Valves stretched lanceolate, head and footpoles rounded and nearly equal in breadth, length 36.5 µm, breadth 5.5 µm, about 13 striae in 10 µm.

***Denticula elegans* Kützing var. *lacus-karluki* Manguin ex Kociolek & Reviere**

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Holotype: pl. 3, fig. 16**Description:** Valvae ellipticae ad polistate rotundatis. Longitudo 16 μm . Latitudo 5 μm . Septa transapicalia 5-6/10 μm . Striae punctatae grosse 20-23/10 μm .**Description:** Valves elliptical, broadly rounded at poles, length 16 μm , breadth 5 μm , 5-6 transapical partitions and 20-23 grossly punctate lines in 10 μm .***Nitzschia lacus-karluki* Manguin ex Kociolek & Reviere**

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Holotype: pl. 4, figs 1, 2 (these two figures are of the same specimen)**Description:** Valvae longissimae linearis-lanceolatae ad extremitatum constrictae-rostratae, polis rotundatis. Longitudo 211 μm . Latitudo 8.5 μm . Carina excentrica, non ad partem medianam. Puncta carinalia robustae 6-7/10 μm . Striae delicatae, magnificatione valida non nisi visibiles, 35/10 μm .**Description:** Valves very long, linear-lanceolate, constricted-rostrate at the extremities, poles rounded, length 211 μm , breadth 8.5 μm , keel excentric not returning towards the median part, keel puncta robust 6-7 in 10 μm . Striae delicate, visible only (hyrax) with high magnification, 35 in 10 μm .***Surirella biseriata* Brébisson var. *spinifera* Manguin ex Kociolek & Reviere**

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Holotype: pl. 5, fig. 11**Description:** Valvae ellipticae-lanceolatae. Longitudo 131-155 μm . Latitudo 43-54 μm . Canales 15-20/100 μm . Pagina valvae spinis parvis.**Description:** Valves elliptical-lanceolate, length 131-155 μm , breadth 43-54 μm , 15-20 canals in 100 μm . Surface of the valves covered with small spines.**Comment:** Manguin provided three figures for this taxon (pl. 4, fig. 4, pl. 5, figs 10, 11), and we have selected one that represents an actual specimen as the holotype.***Surirella hannai* Kociolek & Reviere****(*S. laevis* Manguin nom. nud.)**

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Holotype: pl. 4, fig. 6**Description:** Valvae isopolares lineares-ellipticae polis rotundatis-obtusis. Longitudo 46 μm . latitudo 10 μm . Ala planitieii valvae fere perpendicularis, projecturis distinctis destitutis. Canales alarum non quam grandes fenestram, 20-22/100 μm . Paries cellulae structura manifesta et pseudoraphe destituta.**Description:** Valves isopolar linear-elliptical with rounded-obtuse poles, length 46 μm , breadth 10 μm . Wing slightly near perpendicular to valvar plane, without distinct projections. Alar canals not so large, fenestrae 20-22 in 100 μm . Cell wall without either apparent structure or pseudoraphe.

Comment: Manguin had originally used the name *S. laevis*, but it is occupied both by *S. laevis* Kützinger and *S. laevis* Cleve-Euler. We name this diatom for Margaret Hanna of the California Academy of Sciences.

***Surirella linearis* Wm. Smith var. *lucus-karluki* Manguin ex Kociolek & Reviere**

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Holotype: pl. 4, fig. 8

Descriptio: *Valvae lineares ad lineares-ellipticae, polis rotundatis-obtusis. Longitudo 58-85 µm. Latitudo 18-25 µm. Projecturae alarum admodum manifestae. Canales circa 15-20/100 µm, latitudine eadem modo ac fenestram. Pagina valvae inter marginem alarum et lineam medianam leviter inferna. Membrana striata subtiliter et spinis pusillis impleta.*

Description: Valves linear to linear-elliptical, rounded-obtuse at the poles, length 58-85 µm, breadth 18-25 µm. Alar projections quite apparent, about 15-20 canals in 100 µm, the same as the fenestrae. Surface of the valve between the margin of the wings and the median line noticeably lower. Finely striated membrane and filled with small spines.

Comment: Manguin provided two illustrations of this taxon (pl. 4, figs 7, 8), and we have chosen the one that provides greater detail of this diatom.

***Surirella robusta* Ehrenberg var. *hispinosa* Manguin ex Kociolek & Reviere**

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Holotype: pl. 4, fig. 9

Descriptio: *Valvae heteropolaris leviter. Longitudo 207-209 µm. Latitudo 61 µm. Canales 10-20/100 µm. Linea mediana spina robusta uncata et subterminali ad extremitatem.*

Description: Valves heteropolar slightly marked length 207-209, breadth 61 µm, 10-20 canals in 100 µm. Median line with a robust spine hooked and subterminal at the extremities.

***Surirella tenera* Gregory f. *manguini* Kociolek & Reviere
(*S. tenera* f. *punctata* Manguin nom. nud.)**

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Holotype: pl. 5, fig. 13

Descriptio: *Longitudo 137 µm, latitudo 38 µm. Canales 19-20/100 µm. Paries cellulae punctis numerosis tectus.*

Description: Length 137 µm, breadth 38 µm; 19-20 canals in 100 µm; cell wall strewn with numerous projections.

Comment: Manguin had used the name *Surirella tenera* f. *punctata*, but that name is preoccupied by *S. tenera* f. *punctata* Skvortzow.

Surirella turgidoides Manguin ex Kociolek & Reviere

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Holotype: pl. 5, fig. 14

Descriptio: *Valvae ellipticae-lanceolatae, heteropolaris leviter polis rotundatis-obtusis. Longitudo 109-112 µm. Latitudo 41-42 µm. Alae et projecturae admodum manifestae. Canales alarum parvior quam fenestra, 11-14/10 µm. Latera leviter prolongata in cursum lineae medianae. Linea mediana ad extremitatum vena projecta. Valvae inter lineam medianam et marginem alae leviter infernae. Membrana striata, 25-27/10 µm, spinis pusillis impleta.*

Description: Valves with heteropolarity slightly emphasized with a elliptical-lanceolate contour, poles rounded-obtuse, length 109-112 µm, breadth 41-42 µm, wing and projections very apparent, alar canals less large than the fenestrae 11-14 in 100 µm. Sides slightly prolonged in the direction of the median line, the latter has present a vane projecting at the extremities. Valves weakly lower between the median line and the border of the wing; striated membrane 25-27 striae in 10 µm, covered with small spines.

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